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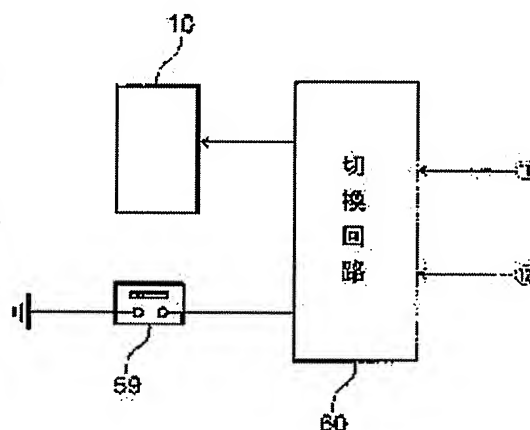
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(54) MONITOR CAMERA DEVICE FOR CONSTRUCTION MACHINERY

(57)Abstract:

PROBLEM TO BE SOLVED: To improve operating efficiency by eliminating the interruption of operation by automatically changing over an image in response with operation of an operator.

SOLUTION: In a monitor camera device for construction machinery having a rear monitor camera 12 monitoring the rear of the construction machinery and a front monitor camera 11 monitoring a front and selectively projecting the images by each monitor camera 11 and 12 onto one display 10, the monitor camera device has a pressure switch 59 detecting the execution of traveling operation and outputting a traveling detecting signal and a changeover circuit 60 changing over the image projected onto the display 10 from the image by the front monitor camera 11 to the image by the rear monitor camera 12 when the traveling detecting signal from the pressure switch 59 is at on.



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CLAIMS

[Claim(s)]

[Claim 1]A monitoring camera system of construction machinery characterized by comprising the following.

Two or more surveillance cameras containing a specific surveillance camera which photos a specific field of construction machinery.

A display which displays one of two or more images depended on each of these surveillance cameras.

A detection means to detect that operation which needs surveillance of the above-mentioned specific field was performed.

A means for switching which switches a display picture on the above-mentioned display to an image by the above-mentioned specific surveillance camera automatically when the above-mentioned operation is detected.

[Claim 2]In a monitoring camera system of the construction machinery according to claim 1, a back surveillance camera which photos back of construction machinery as a specific surveillance camera, A monitoring camera system of construction machinery, wherein a travel operation detection means to detect travel operation of construction machinery as a detection means was used, respectively, and a means for switching is constituted so that a display picture on a display may be automatically switched to an image by the above-mentioned back surveillance camera, when travel operation is detected.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention]This invention relates to the monitoring camera system of the construction machinery which switches one of the images from the arranged surveillance camera to the display of a cab, and displays it, for example on the circumference of construction machinery, such as a hydraulic excavator.

[0002]

[Description of the Prior Art]As a monitoring camera system of the construction machinery mentioned above, When both the video signals from the surveillance camera formed in two places, the front and the back of a hydraulic excavator, at each are transmitted to the display of a cab and an operator chooses one of them with a selector, What was constituted so that the video signal of the selected one might be displayed on a display is known (publication of unexamined utility model application Heisei 7-20354).

[0003]According to this monitoring camera system, digging etc. can be worked looking at the image from the front surveillance camera currently displayed on the display, and it becomes possible to check rearward visibility by on the other hand seeing the image from the back surveillance camera currently displayed on the display at the time of sternway.

[0004]

[Problem(s) to be Solved by the Invention]However, if it is going to check back in order to reverse a hydraulic excavator, when working choosing the image of a front surveillance camera and looking at a display in the above-mentioned monitoring camera system, An operator has the problem that digging operation etc. are interrupted, a selector must be operated, the image displayed on a display must be switched, work is interrupted, and working efficiency falls.

[0005]Like [in the case of extending an excavated hole, for example or improving the ground face around a hole], when repeating operation of little-by-little front and sternway, and operation of digging etc. by turns, if it tries to save time and effort and switching operation is neglected, the safety check at the time of retreat will not be obtained.

[0006]This invention is made in view of the technical problem of such conventional technology, and is a thing.

the purpose is making it make an image switch automatically according to the operation boiled and depended, and is providing the monitoring camera system of the construction machinery which can cancel discontinuation of work and can aim at improvement in working efficiency.

[0007]

[Means for Solving the Problem]This invention is characterized by a monitoring camera system of construction machinery comprising the following.

Two or more surveillance cameras containing a specific surveillance camera which photos a specific field of construction machinery.

A display which displays one of two or more images depended on each of these surveillance cameras.

A detection means to detect that operation which needs surveillance of the above-mentioned

specific field was performed.

A means for switching which switches a display picture on the above-mentioned display to an image by the above-mentioned specific surveillance camera automatically when the above-mentioned operation is detected.

[0008]If it is when based on a monitoring camera system of this invention, Since an image displayed on a display is automatically switched to a camera image (claim 2 image of a back surveillance camera) of a field which needs surveillance in relation to this operation when specific operation (claim 2 travel operation) is performed, It becomes possible to omit switching operation of an image, and efficiency of work increases. Since an image projected on a display switches to an image by a specific surveillance camera whenever specific operation is performed, safety may be raised.

[0009]

[Embodiment of the Invention]Hereafter, the embodiment of this invention is described in detail based on a drawing.

[0010]The front view showing the excavator which applied the monitoring camera system of the construction machinery which requires drawing 1 for this invention, The figure which looked at the cab with which drawing 2 was equipped in the excavator from the operator side, the figure in which drawing 3 shows the operation states of a traction lever, The figure in which drawing 4 shows the fitting location of a front surveillance camera, the figure in which drawing 5 shows the fitting location of a back surveillance camera, The figure showing the composition of the hydraulic circuit equipped with drawing 6 in the excavator and drawing 7 are the figures showing the composition of the switch circuit (means for switching) for switching electrically the image displayed on the display formed in the cab.

[0011]The excavator shown in drawing 1 is provided with the following.

Base carrier 1.

The revolving super-structure 2 provided on it so that revolution was possible.

Boom 3.

The TERESUKO arm 4 of the multi stage elastic type attached at the tip of the boom 3, and the excavation bucket 5 attached at the tip of the TERESUKO arm 4, The front surveillance camera 11 which is attached to the tip part of the boom 3 and supervises the neighborhood of the excavation bucket 5, and the back surveillance camera 12 which is formed behind the revolving super-structure 2, is located above the counter weight 2a, and supervises the back of the body.

[0012]Two or more final controlling element 6a, for example, left control lever, right control lever 6b, boom offset operating pedals 6c, left traction levers 7, right traction levers 8, displays 10, etc. for the inside of cab 2b of this excavator to operate each part as shown in drawing 2 are formed.

[0013]If the left traction lever 7 and the right traction lever 8 can control now a run state on either side independently and move to front ** position as shown in drawing 3, they will move forward, if they move to this side ** position, they will go astern, and if it returns to a center valve position, they will be operated so that it may become a travel stop. The display 10 displays either of the video signals from the front surveillance camera 11 and the back surveillance camera 12.

[0014]As shown in drawing 4, the front surveillance camera 11 is attached to the tip part bottom of the boom 3 so that the neighborhood of the excavation bucket 5 can be supervised, and can supervise the inside of an excavated hole, etc. now. On the other hand, as shown in drawing 5, the back surveillance camera 12 can be attached to the bracket 14 for attaching the illumination light 13 provided in the rear of the revolving super-structure 2, and can check the rearward visibility of the body now.

[0015]Both the video signals picturized by these front surveillance camera 11 and the back surveillance camera 12 are given to said display 10 via the switch circuit 60 mentioned later, and switching operation of the switch circuit 60 is performed based on the signal from the travel operation circuit shown in drawing 6.

[0016]In drawing 6, the hydraulic pump P1, P2, and the pilot pump P3 operate by the drive of the engine E, respectively.

[0017]The pressure oil breathed out from the hydraulic pump P1 is supplied to the control valve 25 for right run motors, the control valve 26 for buckets, the control valve 27 for booms, and the cut valve 28 which were arranged by center bypass-line LC of the left-hand side in a figure through the run rectilinear-propagation valve 24. The control valve 25 for right run motors is a thing which moves forward or drives [retreat] the hydraulic motor 29 for a right run, The control valve 26 for buckets is for carrying out the elastic drive of the cylinder 32 for buckets, the control valve 27 for booms carrying out the elastic drive of the cylinders 33a and 33b for booms, and the cut valve 28 pouring pressure oil to the right-hand side center bypass-line RC side.

[0018]On the other hand, the pressure oil breathed out from the hydraulic pump P2 is supplied to the control valve 35 for left run motors, the control valve 36 for revolution, the control valve 37 for arms, and the cut valve 38 which were allocated on center bypass-line RC through the run rectilinear-propagation valve 24. The control valve 35 for left run motors is a thing which moves forward or drives [retreat] the hydraulic motor 39 for a left run, The control valve 36 for revolution drives the hydraulic motor 40 revolved in the revolving super-structure 2, the control valve 37 for arms drives the cylinder 41 for arms, and the cut valve 38 pours pressure oil to the left-hand side center bypass-line LC side.

[0019]Said run rectilinear-propagation valve 24 has two switching positions, and at the time of the 1st switching position, the pressure oil from the hydraulic pump P1 is supplied to the center bypass-line LC side, and it supplies independently the pressure oil from the hydraulic pump P2 to the center bypass-line RC side, respectively. When it is in the state which operated the traction levers 7 and 8 on either side into the same position and the boom 3 and the arm 4 are operated, for example, It switches from the 1st switching position to the 2nd switching position so that run tracking can be maintained, and it comes to be parallel with both the center bypass lines LC and RC in the pressure oil from the hydraulic pumps P1 and P2.

[0020]The pressure oil breathed out from the pilot pump P3, It is used as a pressure source for various control containing the remote control valves 52 and 53 for controlling the switching position of the remote control valves 50 and 51 for controlling the switching position of the control valve 25 for right run motors, and the control valve 35 for left run motors. The control valve 25 for right run motors has the switching position a for advance, and the center valve position b and the switching position c for sternway, and has the switching position d for advance, and the center valve position e and the switching position f for sternway also about the control valve 35 for left run motors.

[0021]If the right traction lever 8 is moved to the advance position, pilot pressure will be drawn from the remote control valve 50, If the control valve 25 for right run motors is switched to the switching position a from the center valve position b via the pilot line 55a and the right traction lever 8 is moved to the sternway position, Pilot pressure is drawn from the remote control valve 51, and the control valve 25 for right run motors is switched to the switching position c from the center valve position b via the pilot line 55b.

[0022]If the left traction lever 7 is moved to the advance position, pilot pressure will be drawn from the remote control valve 52, If the control valve 35 for left run motors is switched to the switching position d from the center valve position e via the pilot line 54a and the left traction lever 7 is moved to the sternway position, From the remote control valve 53, pilot pressure is drawn and the control valve 35 for left run motors is switched to the switching position f from the center valve position e via the pilot line 54b.

[0023]To the oilway which connects the above-mentioned pilot lines 54a and 54b, the shuttle valve 56, The shuttle valve 57 is formed in the oilway which connects the pilot lines 55a and 55b, the shuttle valve 58 for making high rank selection about each shuttle valves 56 and 57 further is formed, and the pressure switch 59 as a detection means is formed in the downstream of the shuttle valve 58. This pressure switch 59 changes oil pressure signals into an electrical signal, when the pilot pressure drawn via the shuttle valve 56 or 57 and the shuttle valve 58 is detected. That is, if either of the traction levers 7 and 8 is also moved forward or retreat

operated, a trigger signal will be outputted to the switch circuit 60 mentioned later. It is because it is taking into consideration trying to detect any [of advance and retreat] operation in this embodiment also when making it circle in 180 degrees of revolving super-structures 2 and moving forward or retreating.

[0024]The run detecting signal outputted from the pressure switch 59 is given to the electric circuit built in the display 10 shown in drawing 7. This electric circuit is provided with the switch circuit (means for switching) 60 which has the relay which switches the video signal from [both] said front surveillance camera 11 and the back surveillance camera 12, While the trigger signal from said pressure switch 59 is inputted into this switch circuit 60, the video signal picturized by the front surveillance camera 11 and the back surveillance camera 12 is inputted. However, switching operation of the switch circuit 60 shall usually be carried out so that the image from the front surveillance camera 11 may be displayed on the display 10.

[0025]The switch circuit 60 will switch the image from the front surveillance camera 11 which was being projected on the display 10 till then to the image picturized by the back surveillance camera 12, if the run detecting signal from the pressure switch 59 is turned on. Then, if a traction lever is returned to a center valve position and a run detecting signal is no longer inputted from said pressure switch 59, the switch circuit 60 will switch the image from the back surveillance camera 12 which was being displayed on the display 10 till then to the image by the front surveillance camera 11.

[0026]Therefore, if operation of the traction levers 7 and 8 is performed when based on this embodiment, The pressure switch 59 as a detection means detects it, and the electrical signal of one is outputted, The switch circuit 60 as a means for switching switches automatically the image projected on the display 10 from the front surveillance camera 11 to the back surveillance camera 12, If operation of the traction levers 7 and 8 is stopped, in order to switch the image from the back surveillance camera 12 to the image from the front surveillance camera 11 automatically, it becomes possible to omit manual switchover operation of two or more surveillance cameras, and it becomes possible to improve the efficiency of work. Since the image projected on the display 10 is automatically switched to the back surveillance camera 12 from the front surveillance camera 11 whenever operation of the traction levers 7 and 8 is performed, safety may be raised.

[0027]Although sequence control was carried out to the change of the video signal picturized by the front surveillance camera and the back surveillance camera using the switch circuit 60 which has a relay in the embodiment mentioned above, this invention is also controllable by software not only using this but a microcomputer.

[0028]Although the operating pressure of the remote control valve was detected and being changed into the electrical signal (run detecting signal) in the embodiment mentioned above, When it is constituted so that operation of a remote control valve may be controlled using a microcomputer, it can also constitute so that two or more surveillance cameras may be switched based on the control signal outputted from the microcomputer.

[0029]Although the back of construction machinery was automatically switched to the image according a display display to the back surveillance camera 12 as a specific field in the embodiment mentioned above at the time of travel operation, this specific region can be variously changed according to the kind of construction machinery, etc. For example, gyrating operation makes the machinery side a specific region, supervises with a side surveillance camera at the time of gyrating operation, and it may be made to switch the display picture of a display to the image of a side surveillance camera automatically in the construction machinery performed frequently like a hydraulic excavator or a crane.

[0030]

[Effect of the Invention]As explained in full detail above, when being based on this invention and specific operation (claim 2 travel operation) is performed, Since the image displayed on a display is automatically switched to the camera image (claim 2 image of a back surveillance camera) of the field which needs surveillance in relation to this operation, it becomes possible to omit the switching operation of an image, and the efficiency of work increases. Since the image projected on a display switches to the image by a specific surveillance camera whenever specific operation

is performed, safety may be raised.

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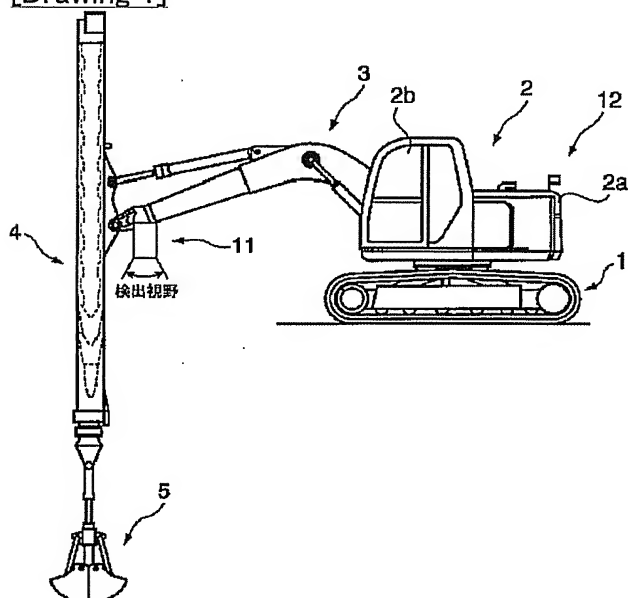
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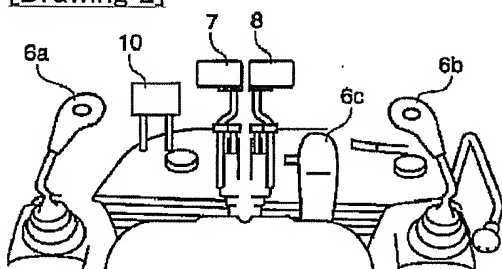
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DRAWINGS

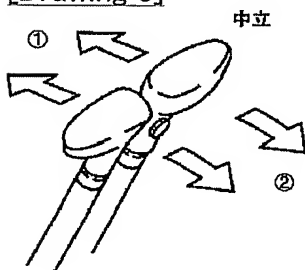
[Drawing 1]



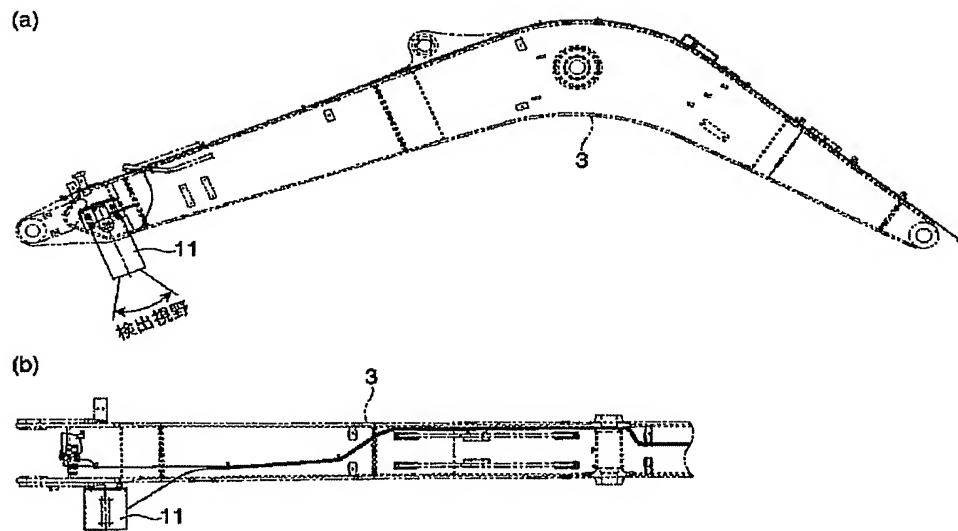
[Drawing 2]



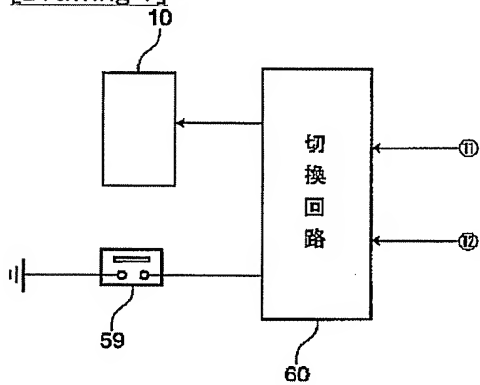
[Drawing 3]



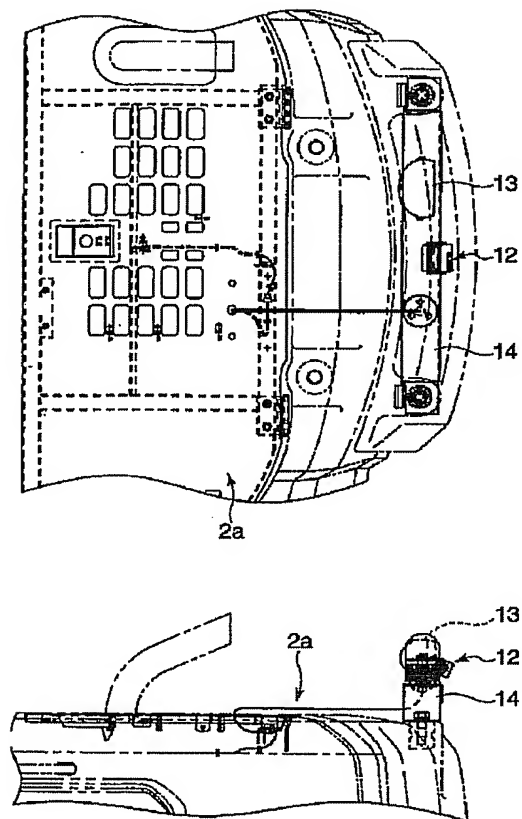
[Drawing 4]



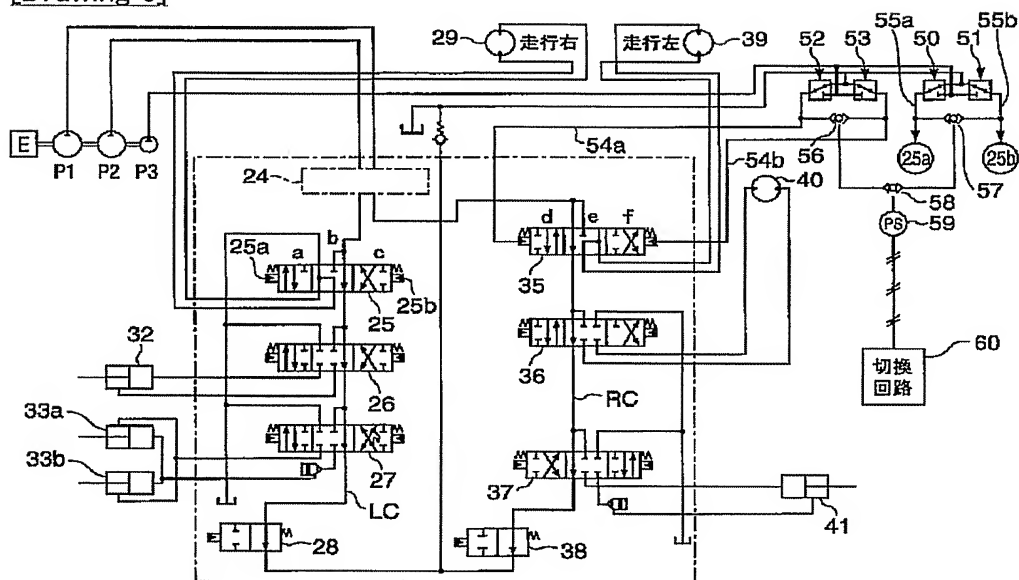
[Drawing 7]



[Drawing 5]



[Drawing 6]



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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1]It is a front view showing the excavator which applied the monitoring camera system of the construction machinery concerning this invention.

[Drawing 2]It is the figure which looked at the cab with which the excavator of drawing 1 was equipped from the operator side.

[Drawing 3]It is a figure showing the operation states of the traction lever with which the excavator of drawing 1 was equipped.

[Drawing 4]It is a figure showing the fitting location of the front surveillance camera with which the excavator of drawing 1 was equipped.

[Drawing 5]It is a figure showing the fitting location of the back surveillance camera with which the excavator of drawing 1 was equipped.

[Drawing 6]It is a figure showing the composition of the hydraulic circuit with which the excavator of drawing 1 was equipped.

[Drawing 7]It is a figure showing the composition of the switch circuit for switching electrically the image displayed on the display with which the excavator of drawing 1 was equipped.

[Description of Notations]

7 Left traction lever

8 Right traction lever

10 Display

11 A front surveillance camera

12 Back surveillance camera

50, 51, 52, 53 remote control valves

54a, 54b, 55a, and 55b Pilot line

56, 57, 58 shuttle valves

59 Pressure switch (detection means)

60 Switch circuit (means for switching)

[Translation done.]